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EFFICACY OF FUNGICIDES. XXVII. EVALUATION OF BENZIMIDAZOLE AND OTHER FUNGICIDES AS DIP TREATMENT FOR REDUCING LOSSES CAUSED BY POST-HARVEST FUNGAL SPOILAGE OF BANANA FRUITS

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Losses due to post-harvest spoilage of banana fruits caused by *Curvularia lunata* were effectively reduced by treatment of fruits with propionic acid, salicylic acid and sodium metabisulphite. Benzimidazole fungicides failed to provide any promising result.

INTRODUCTION

The research on the control of post-harvest diseases of fruits is still in the stage of infancy in India although considerable progress has been made in some of the western countries on this aspect of the problem (Dharam Vir, 1981a, b). Banana fruits are prone to attack by a number of post-harvest diseases during transport and storage (Srivastava and Tandon, 1971). During extensive survey of Delhi fruit markets, a number of fungi were observed causing rot and decay of banana fruits. Amongst these, *Curvularia lunata, Colletotrichnm musae, Aspergillus niger, A. flavus, A. fumigatus, Fusarium moniliforme* and *F. semetectum* were most frequently encountered (Dharam Vir, 1977 ; Dharam Vir and Sharma, 1982 ; Ved Ram and Dharam Vir, 1983). The spoilage caused by *Curvularia lunata* is characterised by presence of black, water soaked sunken lesions with irregular margins. In the beginning, the infection is limited to skin. However in advanced stage it travels deep into the pulp and spreads over the entire surface of fruit resulting in complete loss of fingers. Studies carried out on the control of this disease with the help of some benzimidazole derivatives and other fungicides are reported in the paper.

MATERIALS AND METHODS

Fresh and apparently healthy fruits of banana were used in the studies. Fungicides were evaluated by standard method described by Eckert and Kolbezan (1964). The fruits were given artificial injury in the form of pricks with the help of sterilized entomological pin followed by inoculation with spore sus-

pension of *Curvularia lunata* prepared in sterilized water. After 12 hours of incubation, the inoculated fruits were dipped in fungicidal solution prepared in water. The fruits were dried and packed in cardboard boxes. Suitable checks were maintained. Disease intensity was recorded at suitable intervals and was calculated as percentage decay by a method described by Srivastava and Tandon (1968). Four fungicides belonging to benzimidazole group viz., benomyl, carbendazim, thiabendazole, thiophanate methyl and five other anti-fungal agents were evaluated against the disease.

RESULTS AND DISCUSSION

The data regarding evaluation of various fungicides in controlling Curvularia rot of banana are presented in Table 1. Perusal of results indicate that treatment with propionic acid, salicylic acid and sodium metabisulphite kept the banana fruits free from infection up to 8 days of storage. The treatment of fruits with systemic fungicides benomyl, thiabendazole and carbendazim suppressed the decay to a limited extent up to 4 days after which the fungicidal effect was totally lost. As a matter of fact these benzimidazole fungicides appear to play some role in acceleration of rotting when used against this disease.

TABLE 1. *Post-harvest chemical treatments against spoilage of banana caused by* Curvularia lunata

Name of fungicide	Concentration in ppm	Percentage of rot after storage period (days)	
		4	8
Thiophanate methyl	2000	7.0	16.4
Benomyl		1.6	18.5
Thiabendazole		1.7	19.4
Carbendazim		1.9	20.9
Propionic acid		0.0	0.0
Salicylic acid		0.0	0.0
Boric acid		7.5	18.0
Sodium hydrogen carbonate		8.0	19.0
Sodium metabisulphite		0.0	0 0
Control		7.5	15.0

Similar type of observations of enhanced decay with benzimidazole fungicides against Curvularia rot of other fruits have been recorded by some workers (Valdebenito and Pinto, 1972 ; Wallbridge and Pinegar, 1975). Benzimidazole fungicides have failed to show any promising result against this disease although some earlier work carried out at this laboratory and other centres of of research have shown their superiority as post-harvest treatments against a variety of storage diseases of fruits (Chandra and Khanna, 1981 ; Dharam Vir,

1979, 1982 ; Mandal and Dasgupta, 1982 ; Sharma and Dharam Vir, 1983 ; Ved Ram and Dharam Vir, 1983).

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